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Original Article

Factors affecting family physicians' drug prescribing: a cross-sectional study in Khuzestan, Iran

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Abstract

Background: Rational prescription is a considerable issue which must be paid more attention to assess the behavior of prescribers. The aim of this study was to examine factors affecting family physicians' drug prescribing.

Methods: We carried out a retrospective cross-sectional study in Khuzestan province, Iran in 2011. Nine hundred eighty-six prescriptions of 421 family physicians (including 324 urban and 97 rural family physicians) were selected randomly. A multivariate Poisson regression was used to investigate potential determinants of the number of prescribed drug per patient.

Results: The mean of medication per patient was 2.6 ± 1.2 items. In the majority (91.9%) of visits a drugs was prescribed. The most frequent dosage forms were tablets, syrups and injection in 30.1%, 26.9%, and 18.7% of cases respectively. Non-Steroidal Anti-Inflammatory Drugs (NSAIDs) and antibiotics were 29.7% and 17.1% of prescribed drugs respectively. The tablets were the most frequent dosage forms (38.6% of cases) in adult's patients and syrups were the most frequent dosage forms (49% of cases) in less than 18 years old. Paracetamols were popular form of NSAIDs in two patients groups. The most common prescribed medications were oral form.

Conclusion: In Khuzestan, the mean of medication per patient was fewer than national average. Approximately, pattern of prescribed drug by family physicians (including dosage form and type of drugs) was similar to other provinces of Iran.

Keywords: Drug Prescribing, Family Physician, Primary Care, Khuzestan

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Key Messages

Implications for policy makers

- The result of this paper can help health managers and policy-makers to find the cause of the inappropriate prescriptions by family physicians.
- Also the results can help policy-makers to analyze and assess the prescribing behavior of Iranian family physicians.

Implications for public

Generic drug prescription policies and prescribing behavior of physicians impact on the health economic status and community's health; hence, factors affecting prescribing behavior of family physicians and General Practitioners (GPs) should be assessed in order to improve the demand and supply chain of generic drugs and community's health.

Introduction

In the recent years, the Ministry of Health and Medical Education (MoHME) in the Islamic Republic of Iran has focused on the primary healthcare and referral system (1). In 2005, a Family Physician Program (FPP) was implemented in all rural areas and cities with less than 20,000 populations (2–4). According to this program, every family physician should prescribe drugs rationally just for first-level patients. Also they were prescribing less than 270 types of essential generic drug. These restrictions of drug prescription lead to reduce the number of drugs per prescription and change of prescription pattern by General Practitioners (GPs) (4). Since 2012, FPP was implemented as a pilot in some cities with 20,000–50,000 population in three provinces of Iran including: Khuzestan, Sistan-va-Bluchestan and Cheharmahal Bakhtiari (5). Family medicine has been in conflict about whether it is a special or general discipline (6). In Iran, GPs play role of family physicians. Family physicians are skilled physicians that have been empowered in the care of patients with acute and chronic problems. They are skilled in assessing effectiveness of the care in a practice (7). Family physician as a gatekeeper can make decisions about the appropriate use of health resources. Gatekeepers help patients to identify their health needs and select services efficiently (8). They reduce health expenditures and improve the health outcomes (9). Rational prescription of medicines is an important issue

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which must be paid more attention to assess the behavior of prescribers. For this reason, the World Health Organization (WHO) has provided the essential drugs list for all countries (10). "Essential drugs" was proposed by WHO in 1977 and defined as drugs with availability, safety, effectiveness, and rational use (11). In 1985, WHO held a conference of experts on the rational use of drugs in Nairobi, which declared that "patients receive medications appropriate to their clinical needs, in doses that meet their own individual requirements, for an adequate period of time, and at the lowest cost to them and their community" (12). A study showed that cost of drug prescription by GPs has increased over 12% in UK (13). In 1993 about 1.9 billion prescriptions were written in United States and in 2008 these numbers were 3.1 billion that at least 34% of these prescription were prescribed inappropriately (14,15). WHO reported that more than 50% of all medicines were prescribed inappropriately (11). Some studies showed that importance of rational prescribing in low and lower-middle-income countries is higher (16). In our study we investigated drug prescribing behavior of family physicians in Khuzestan province.

Methods

Setting and samples

We carried out a multi-centric cross-sectional study in Khuzestan province, Iran, in 2011. Khuzestan province is one of the broad provinces of Iran with 4,531,720 population and 24 health networks. This study involved the rural and urban primary care family physicians. First, we obtained a list of family physicians by health services deputy of Ahvaz University of Medical Sciences. Four hundred twenty-one physicians including 324 urban and 97 rural family physicians were working in primary care centers of Khuzestan. We selected 986 prescriptions randomly. To achieve even greater representativeness in the sample of the population, we selected 750 prescriptions of rural physicians and 236 prescriptions of urban physicians using proportional sampling method. In this study, the level of Confidence Interval (CI) and statistical power were determined 95% and 80% respectively.

Data collection

Data were collected from family physicians' prescriptions and patient's health records retrospectively. According to national FPP all prescription should be referred to Iranian health insurance organization monthly. Therefore, supplementary data were collected by Iranian health insurance organization database.

Data analysis

In this study, dependent variable was the number of generic prescribed drugs. Independent variables were included: at the patient's level (gender, age, health insurance plan, the main complaint, referral status), at the physician's level (gender, age, practicing years, being native, location of work, type of employment). Data were analyzed by using univariate tests including T-test and One-way Analysis of Variance (ANOVA). Finally, Poisson regression analysis was used to assess factors affecting drugs prescribing (17,18).

Results

Tables 1 and 2 report the descriptive results of the categorical variables. The results showed that the majority of patients (57.5%) were female. The mean age of the patients was 31.5 ± 21.3 years. Also all the patients were covered by one of the Iranian medical insurance plans including: rural health insurance plan, medical services insurance, social security insurance and military force insurance funds. In this study, the main complaints of patients were: common cold (36.7%), stomach ache (9.6%), low back pain (9.5%), and sore throat (4.8%) respectively (see Table 1). Also the results showed that 54.4% of physicians were female. The mean age of the physicians was 35.6 ± 4.4 years. Only 33.4% of the physicians were native. According to results of this study, 906 (91.9%) patients were not referred to specialists by family physicians. The results of study showed that 275 (27.8%) of the patients were children (less than 18 years old). Fifty-one percent of the children were male and 48.4% were female. Mostly these patients were covered by rural health insurance plan and medical services insurance (82.2% and 11.6% respectively). The main complaints of children were: common cold (62.5%),

Table 1. Descriptive statistics of the Patients characteristic (n= 986)

Variables		Number (%)
Gender		
	Male	419 (42.5)
	Female	567 (57.5)
Age/year		
	<10	204 (20.7)
	11-20	97 (9.8)
	21-30	222 (22.5)
	31-40	170 (17.2)
	41-50	93 (9.4)
	51-60	83 (8.4)
	>60	117 (11.9)
Type of health insurance*		
	Rural health insurance plan	800 (81.1)
	Medical services organization	118 (12.0)
	Social security fund	55 (5.6)
	Militarily force insurance	13 (1.3)
The Number of visits/year		
	1	469 (47.6)
	2	376 (38.1)
	3	92 (9.3)
	4≤	49 (5.0)
The main complaints		
	Common cold	362 (36.7)
	Stomach ache	95 (9.6)
	Low back pain	94 (9.5)
	Sore throat	47 (4.8)
	Other**	388 (39.3)

*These health insurance funds are the largest health insurance shames in Iran that approximately cover over the 90% of population.

**Other disease and disorder were included: headache, sneezing, allergy, trauma, rash, asthma, eczema, anemia, diabetes, hypertension and so on.

Table 2. Descriptive statistics of the less than 18 years old (n= 275)

Variables		Number (%)
Gender		
	Male	133 (48.4)
	Female	142 (51.6)
Age/year		
	<1	48 (17.5)
	1-10	156 (56.7)
	11-18	71 (25.8)
Type of health insurance*		
	Rural health insurance plan	226 (82.2)
	Medical services organization	32 (11.6)
	Social security fund	11 (4.0)
	Militarily force insurance	6 (2.2)
The Number of visits/year		
	1	125 (45.5)
	2	121 (44.0)
	3	24 (8.7)
	4≤	5 (1.8)
The main complaints		
	Common cold	172 (62.5)
	Fever	85 (30.9)
	Sore throat	12 (4.4)
	Stomach ache	4 (1.5)
	Dysmenorrhea	2 (0.7)

fever (30.9%) and sore throat (4.4%) respectively (see Table 2). According to this study, in adults and children, the average of prescriptions per patient was 2.6 ± 1.2 and 1.2 ± 0.5 item respectively. A medications were not prescript in 80 (8.1%) of prescription. In less than 18 years old group, in 29.1% of cases was prescript more than 3 items. In adults patients group, in 20% of cases was prescript more than 3 items. The most common dosage forms were: tablets (30.8%), syrups (24.4%), injection drugs (19.1%), and capsules (9.8%) respectively. In children, the most common used dosage forms were: tablets (13.7%), syrups (49%), injection drugs (12.5%), and drops (8.3%). Totally, the most frequent prescribed drugs were: Non-Steroidal Anti-Inflammatory Drugs (NSAIDs) (29.7%), antibiotics (17.1%), cough/cold drugs (11%), and anti-allergy (9.7%) respectively. In the less than 18 years old group, the most frequent prescribed drugs were: NSAIDs (28.6%), antibiotics (22.8%), cough/cold drugs (16.6%), and anti-allergy (13.3%) respectively. Paracetamol was prescript in 18.2% and 6.1% of cases for children and adults patient's respectively. Table 3 shows that the children and adults groups had a similar pattern in term of prescription of NSAIDs. The results show that oral medications were prescript more than others (see Table 3).

The results showed that patient's characteristics including: the main complaints and the number of visits per year had statistical significant effect on the number of drugs per prescription ($P<0.05$). According to Poisson regression

Table 3. Compression of prescribed drugs between adults and children

Variables		Children* (n= 275)	Adults (n= 711)	All patients (n= 986)
Number of drug per patient Mean ± SD= 1.2 ± 0.5	0	17 (6.2%)	63 (8.9%)	80 (8.1%)
	1	19 (6.9%)	62 (8.7%)	81 (8.2%)
	2-3	159 (57.8%)	444 (62.4%)	603 (61.2%)
	>3	80 (29.1%)	142 (20.0%)	222 (22.5%)
Dosage form	Tablet	113 (13.7%)	712 (38.6%)	825 (30.8%)
	Syrup	402 (49.0%)	251 (13.6%)	653 (24.4%)
	Ampule	103 (12.5%)	408 (22.1%)	511 (19.1%)
	Capsule	43 (5.3%)	220 (11.9%)	263 (9.8%)
	Ointment	17 (2.0%)	103 (5.5%)	120 (4.4%)
	Drop	69 (8.3%)	34 (1.8%)	103 (3.8%)
	Lotion	10 (1.2%)	77 (4.1%)	87 (3.2%)
	Others	75 (9.0%)	38 (2.0%)	113 (4.2%)
Type of drug	NSAID	235 (28.6%)	617 (33.5%)	852 (29.7%)
	Paracetamol**	150 (18.2%)	112 (6.1%)	262 (8.9%)
	Antibiotics	188 (22.8%)	312 (16.9%)	500 (17.1%)
	Cough/cold drugs	137 (16.6%)	184 (10.0%)	321 (11.0%)
	Anti-allergy	110 (13.3%)	175 (9.5%)	285 (9.7%)
	Anti-acid	28 (3.4%)	157 (8.5%)	185 (6.3%)
	Antispasmodic	10 (1.2%)	58 (3.1%)	68 (2.3%)
	Anti-hypertension	2 (0.3%)	54 (2.9%)	56 (1.9%)
	Antifungal	4 (0.4%)	49 (2.6%)	53 (1.8%)
	Anti-dyslipidemia	1 (0.1%)	24 (1.3%)	25 (0.8%)
	Others	107 (13.0%)	209 (11.3%)	316 (10.8%)
Form of use	Oral***	627 (77.3%)	1217 (65.9%)	1844 (68.8%)
	Injection	103 (12.5%)	408 (22.1%)	511 (19.1%)
	Topical	27 (3.2%)	180 (9.6%)	207 (7.6%)
	Others	75 (9.0%)	38 (2.0%)	113 (4.2%)

*<18 years; **Paracetamols were included 63.8% of NSAIDs in children's group and 18.1% of NSAID in adults; ***Oral medication including tablet, capsule, syrup, and drop.

analysis, the some characteristics of physicians including: age, being native; and years of practicing had impact on the number of the prescribed drugs.

Discussion

Prescription is the most important function of a physician worldwide (19). Drug prescribing is one of the most common medical decisions by GPs (20). Drugs play an important role in general practicing. Studies show that in some countries, a medication is prescribed in 60% of visits (21). In this study, medication was prescribed in 91.9% of visits. In 8.2% of prescriptions one item, in 61.2% two items, and in 22.5% more than three items was prescribed. Enwere *et al.* found that the physicians prescribed the medication in 91% of visits (22), which their result was close to result of our study. According to audit report in Scotland, there was a minimum one prescription in 60% of physician's visits and more than 90% of the physicians had prescribed at least one medication. The studies showed that the number of prescribed drugs has been increased up to 33% in recent years. In 2012, twenty-four percent of Scotland population received 4 items of drug per prescription. Perhaps a reason of this increasing can be more contact of patients with general practices in the first line of the health network (23). Also Buusman *et al.* showed that GPs were responsible to 90% of the prescribed drugs (24). The results of our study showed that average number of drugs per prescription was 2.6. The result of our study was comparable with other studies in Iran (Table 4).

According to our results, the number of drugs per prescription in Khuzestan province was less than other provinces. In our study the poly-pharmacy term was defined for two and more drugs per prescription (34,35). Other studies have considered more than five medications as a poly-pharmacy (36). Thus, in our study a considerable proportion of patients (83.7%) experienced the poly-pharmacy. Some studies showed that there was relationship between poly-pharmacy and drug-related problems (34), unplanned hospitalization and adverse outcomes (37), increase of patients risk and costs (38), and adverse drug reactions and medication errors (39). According to results of our study, the most prescribed drugs were NSAID (29.7%) and antibiotics (17.1%) respectively. Wang *et al.* showed that 29.9% of the prescriptions were included antibiotics (33). Kumari *et al.* reported that an antibiotic has been prescribed in 64.9% of the prescriptions. This prescription pattern was different in several geographic areas (40). A study showed that antibiotics were prescribed for 39.6% of the patients (41). Therefore, the result of this study was similar to some studies. Different factors impact on the decision to prescribe by physician. These factors include patient characteristics such as age, income status, type of disease and past experiences; and physician characteristics including gender, age, volume of practice and clinical skills; and other factors such as the number of primary care centers and social perceptions of illness (19,42). Also prescription pattern is different between and within countries (43). The studies show that age of physicians and the number of physicians in a health center have a positive impact on the number of prescribed drugs (20). In our study, some physician characteristics including age, being native, and years of practicing had impact on the number of the prescribed drugs.

Table 4. Comparison of the number of drugs per prescription in Iran and other countries (1998–2012)

Authors	Area	Year	Results
Cheragali *et al.* (1)	National	2004	3.4*
	Khuzestan	2004	3.7
Shayan *et al.* (25)	Tabriz	2006	4.5
	Lorestan	2006	4.2
Shamsi *et al.* (26)	Bam	2008	3.5
Dinarvand and Nikzad (27)	Tehran	1998	3.6
Alikhani *et al.* (28)	Yasuj	2006	3.6
Zareshahi *et al.* (29)	Kerman	2012	3.1
Mosleh *et al.* (30)	Tehran	2007	2.5
Ahmad Raza *et al.* (31)	Pakistan	2014	3.3
Rahman *et al.* (32)	Bangladesh	2011	3.8
Wang *et al.* (33)	China	2013	3.5

*The number of drugs per prescription.

Conclusion

We concluded that the mean of the prescribed drugs per patient was less than national level. Approximately, pattern of drug prescribing (including dosage form and type of drugs) was similar to other provinces and NSAIDs were the most frequent prescribed drugs. In this study it was determined that being native, age of physicians and practicing years had significant relationship with the number of prescribed drugs. We recommend a more comprehensive study about factors influencing prescribing behavior of family physicians in national level.

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Ethical issues

The ethical committee of Tehran University of Medical Sciences (TUMS) approved the present study.

Competing interests

The authors declare that they have no competing interests.

Authors' contributions

MA and AT developed theoretical premise and conceptual model; RF and AR designed the research; NF and RA collected data; AT and RF analyzed data; MA drafted the manuscript; AT answered to the reviewers.

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